

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claim 1 (canceled)

Claim 2 (previously presented): The surface-coated machining tool set forth in claim 4, wherein said predetermined thickness of said compound thin film is 0.05 μm or more and less than 2 μm .

Claim 3 (canceled)

Claim 4 (currently amended): A surface-coated machining tool, ~~comprising~~
consisting of:

a machining-tool shank having a blade portion, the blade portion fabricated from a cemented-carbide base material containing tungsten carbide and cobalt, with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less; and
coated to a given thickness in ~~at least~~ a single layer over said cemented-carbide base material, a compound thin film made up of a combination of, in given elemental proportions, one or more elements selected from the group titanium, chromium, vanadium, silicon and aluminum, and one or more elements selected from carbon and nitrogen; wherein

said compound thin film is vapor-deposited onto said base material under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness and said given

elemental proportions, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less to said compound thin film~~[[;]]~~, and

~~wherein~~ said compound thin film has an ~~as-deposited~~ surface roughness of 0.01 μm or more and less than 0.3 μm by indication Ra.

Claim 5 (currently amended): A surface-coated machining tool, comprising:
a cemented-carbide base material containing tungsten carbide and cobalt,
~~with the cobalt inclusion amount being~~ the cemented-carbide base material having a bulk cobalt concentration of 4 weight % or more and 12 weight % or less, the cemented-carbide base material including a cutting surface; and

a hard carbon thin film made up essentially of carbon atoms only, coated to a given thickness over the cutting surface of said cemented-carbide base material ~~in at least a single layer~~, by a physical vapor deposition method in which graphite is made a raw material, and under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less to said compound thin film; wherein

the hard carbon thin film consists of a single layer deposited on the cemented-carbide base material such that substantially the entire hard carbon thin film is in direct contact with the cemented-carbide base material, and a concentration of cobalt at the cutting surface of the cemented carbide base material is substantially equal to the bulk cobalt concentration.

Claim 6 (original): The surface-coated machining tool set forth in claim 5, wherein said hard carbon thin film is 0.05 μm or more, and 3 μm or less in thickness.

Claim 7 (canceled)

Claim 8 (previously presented): The surface-coated machining tool set forth in claim 5, wherein said hard carbon thin film is in surface roughness adjusted to be 0.01 μm or more and 0.5 μm or less by indication Ra.

Claim 9 (canceled)

Claim 10 (original): The surface-coated machining tool set forth in claim 2, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 11 (canceled)

Claim 12 (original): The surface-coated machining tool set forth in claim 4, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 13 (original): The surface-coated machining tool set forth in claim 5, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 14 (original): The surface-coated machining tool set forth in claim 6, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 15 (canceled)

Claim 16 (original): The surface-coated machining tool set forth in claim 8, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 17 (currently amended): The method set forth in claim 24, wherein in (b) the compound thin film is deposited over the base material using A surface-coated machining tool, comprising:

~~a cemented carbide base material containing tungsten carbide and cobalt, with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less; and~~

~~coated to a given thickness in at least a single layer over said cemented carbide base material, by a cathodic-arc deposition process method, a compound thin film made up of a combination of, in given elemental proportions, one or more elements selected from the group titanium, chromium, vanadium, silicon and aluminum, and one or more elements selected from carbon and nitrogen;~~

~~wherein reaction gas pressure, base material bias voltage, and deposition temperature conditions in said cathodic-arc deposition method, together with said given thickness and said given elemental proportions, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less to said compound thin film; and~~

~~wherein said compound thin film has an as-deposited surface roughness of 0.01 μm or more and less than 0.3 μm by indication Ra.~~

Claim 18 (canceled)

Claim 19 (currently amended): A surface-coated machining tool, comprising:
a cemented-carbide base material containing tungsten carbide ~~0.1 μm or more and 1.5 μm or less in pre-sintering crystal grain size,~~ and cobalt, with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less; and
a hard carbon thin film made up essentially of carbon atoms only, coated to a thickness in the range of 0.05 to 0.2 μm or more, and 3 μm or less in thickness over said cemented-carbide base material in ~~at least~~ a single layer, by a physical vapor deposition method in which graphite is made a raw material, and under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said thickness, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and ~~8 GPa~~ 1 GPa or less to said compound thin film.

Claim 20 (currently amended): A surface-coated machining tool, comprising:
a cemented-carbide base material containing tungsten carbide ~~0.1 μm or more and 1.5 μm or less in pre-sintering crystal grain size,~~ and cobalt, the cemented-carbide base material having a bulk cobalt concentration of ~~with the cobalt inclusion amount being~~ 4 weight % or more and 12 weight % or less, the cemented-carbide base material including a cutting surface; and
a hard carbon thin film made up essentially of carbon atoms only, coated to a ~~given~~ thickness in the range of 0.05 to 0.2 μm over the cutting surface of said cemented-carbide base material in ~~at least a single layer,~~ by a cathodic-arc deposition method in which graphite is made a raw material, and under reaction-gas

pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and ~~8 GPa~~ 1 GPa or less is imparted to said hard carbon thin film; wherein

the hard carbon thin film consists of a single layer deposited on the cemented-carbide base material such that substantially the entire hard carbon thin film is in direct contact with the cemented-carbide base material, and a concentration of cobalt at the cutting surface of the cemented carbide base material is substantially equal to the bulk cobalt concentration.

Claims 21-22 (canceled)

Claim 23 (previously presented): The surface coated machining tool set forth in claim 5, wherein the hard carbon film has a thickness of less than 1 μm .

Claim 24 (new): A method for fabricating a surface-coated machining tool, the method comprising:

- (a) providing a machining-tool shank having a blade portion, the blade portion fabricated from a cemented-carbide material containing tungsten carbide and cobalt, cobalt concentration in the cemented carbide material being in the range from about 4 weight percent to about 12 weight percent; and
- (b) vapor depositing a compound thin film at a given thickness onto the blade portion of the tool shank, the compound thin film including at least a single layer made up of a combination of, in given elemental proportions, one or more elements selected from the group consisting of titanium, chromium,

vanadium, silicon and aluminum, and one or more elements selected from the group consisting of carbon and nitrogen, the compound thin film being vapor-deposited onto said base material under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions predetermined together with said given thickness and said given elemental proportions so as to impart to the compound thin film (i) a compressive residual stress of 0.1 GPa or more and 8 GPa or less, and (ii) an as-deposited surface roughness of 0.01 μm or more and less than 0.3 μm by indication *Ra*.